Course Syllabus
STAT 449/649: Quantitative Financial Risk Management
Dr. Katherine B. Ensor
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Fall 2019

Lecture: TTh 10:50 – 12:05 DCH 1045
Office Hours: 1:30 to 2:30 Monday

TA and co-Instructor: Michael Jackson Michael.jackson@rice.edu
TA office hours: TBA

Course Objective: To educate students on the foundation and practical implementation of stochastic calculus and methods underlying financial instruments such as derivatives, forward contracts, options and bonds.

Text:

- Stochastic Calculus for Finance I: The Binomial Asset Pricing Model by Steven E. Shreve. This text will be followed for the first half of the course.
- NOTE – We are in the process of specializing a version of this text to our Rice curriculum. We will be sharing this material with you on a chapter by chapter basis.
- Text 2 – Supplemental material will be provided for the continuous time discussions.

Computing Required: This course will require computing and data analysis, relying on the statistical software package R (https://www.r-project.org/) or RStudio.

Assessment:

- 30% Midterm Exam – in class – October 10th
- 30% Final Exam – comprehensive exam scheduled by the Registrar
- 40% Quizzes, class participation, Canvas discussion participation, and homework.
- There will be additional exam questions, quizzes and homework questions for STAT 649 students based on the assumption of graduate level background knowledge in statistics.
- HW will be assigned and graded for completion (not accuracy). Knowledge assessment will come in the form of quizzes related to the homework. If homework is graded for accuracy, this change will be made clear when the assignment is made.

Attendance: Students will benefit from regular attendance. There is an in class participation component to the grading. If you do miss class you are responsible for obtaining notes and assignments.

Canvas: All course management will take place through CANVAS. If you have a question about the homework post your question on the Canvas website under the 'Discussions' tab. Discussion among students both on the forum and in person is HIGHLY encouraged. If you see a question posted on the discussion forum and you know the answer, please respond. Your level of participation in the HW discussion represents a portion of your quiz and homework grade.

Students with disabilities: Please work with Rice Disability Support Services and apprise me of any accommodations that are needed.

Rough List of Topics: (# of lectures, 30 total class periods)

- (1) Introduction to Derivatives, Forward contracts, Options, Bonds
- (12) Binomial Discrete Time Models
    - (2) Binomial No-Arbitrage Pricing Model
    - (2) Probability theory for discrete events
    - (2) State Prices
    - (2) American Derivative Securities
    - (2) Random Walk
    - (2) Interest-Rate-Dependent Assets
- Midterm Exam – October 4th
- (10) Continuous Time Models
    - (3) Introduction to Stochastic Processes and Modeling Stocks in Continuous Time
    - (3) Black-Scholes + Greeks
    - (3) Volatility, variance contracts and exotic options
    - (1) Liquidity and micro-structure
- (3) Fixed Income Models